

TWO NEW SPECIES OF DIPETALONEMA (NEMATODA, FILARIOIDEA) FROM AUSTRALIAN MARSUPIALS.

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(With Plate I. and nine Text-figures.)

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INTRODUCTION.

Many filariid worms have already been described from Australasian marsupials, by Leidy (1875), von Linstow (1897, 1898, 1905), Breinl (1913), Solomon (1933), Baylis (1934) and Johnston and Mawson (1938a, 1938b). It was therefore rather surprising to find a previously undescribed species in the common bandicoot, *Isoodon obesulus* Shaw and Nodder, and another in the red-legged wallaby, *Thylogale wilcoxi* (McCoy).

The taxonomy of this group of parasites is in an unsettled state. Yorke and Mapleston (1926) founded a genus *Breinlia* for the species which occurs in the possum, *Trichosurus vulpecula*, and which was originally described as *Filaria trichosuri* by Breinl (1913). Solomon (1933) placed the species from the tree kangaroo in this genus, but later workers, including Baylis, Johnston and Mawson, and Chabaud (1952) have regarded *Breinlia* as a synonym of *Dipetalonema* Diesing, and for some years all the species from Australasian marsupials have been assigned to this latter genus. The species described here have therefore also been placed in *Dipetalonema*, though with some reservation, because the writer feels that the genus *Breinlia* may well be revived in the future. Nothing, however, is yet known of the life histories of these parasites. When some of these are elucidated, it may be possible to group the species into natural assemblages.

DIPETALONEMA JOHNSTONI n. sp.

The adult worms were found loosely coiled in the subcutaneous tissue of the anterior abdominal wall of the short-nosed bandicoot, *Isoodon obesulus*. An examination of 33 individuals from various localities in South Queensland showed six to be infected. The infected individuals came from Mount Nebo and Mount Tamborine. Some female specimens collected by Mr. R. Riek from the long-nosed bandicoot, *Perameles nasuta*, also belong to this species. Usually there were from 2 to 10 adult worms present; one individual, however, had a heavier infection, about 25 worms being removed.

TYPES.—Holotype male, allotype female and a skin section showing microfilariae have been deposited in the Queensland Museum.

DISTINCTIVE FEATURES.—Very short and slender; oesophagus uniform in width, vulva immediately post-oesophageal; tail ending in four digitations; long spicule complex, short one relatively simple; no gubernaculum.

MALE.—Capillary in form, 20-32 mm. long by 0.14 mm. in maximum breadth. The cuticle is relatively thick and smooth except in the posterior part of the body, where fine transverse striations appear. These striae are most clearly defined in the spiral portion of the tail. Each stria is ornamented with a row of minute, close-set, regular bosses. Striae and bosses fade out in the cloacal region. The head measures 0.12 mm. in diameter and is followed by a distinct neck, 0.1 mm. in diameter. No cephalic papillae nor oral chitinous structures could be detected. The nerve ring lies about 0.28 mm. from the anterior end. The oesophagus measures 0.7 to 0.9 mm. in length by 0.025 to 0.03 mm. in diameter. It may widen slightly from before backward, but there is no definite division into two parts. The posterior end of the body is coiled into a tight spiral of three or four turns. The tail measures 0.14 mm. from tip to cloaca, and ends in four minute digitations (Text-fig. 2).

The left spicule is long and slender, measuring 0.35 mm. in length by 0.012 mm. in maximum breadth, which is at the proximal end. It consists of a stiff, tubular, proximal portion about 0.18 mm. long, which appears irregularly chitinised or roughened. There is then a more flexible-looking part supported by two slender struts, which seem to merge together to form the curved, needle-like distal portion (Plate 1, fig. 3; text-fig. 2). The smaller, right spicule is 0.080 mm. long by 0.010 mm. wide; it is boat-shaped with the keel directed dorsally. The distal end is bluntly spatulate. The ventral surface appears to be grooved to accommodate the long spicule. There is no gubernaculum. The cloacal papillae consist of two pairs of small pre-anals, two pairs of minute ad-anals and two pairs of post-anals. (These papillae are only shown on one side in text-fig. 2.)

FEMALE.—Considerably larger than the male, measuring 45 to 70 mm. in length by 0.2 to 0.3 mm. in maximum breadth. The cuticle is similar to that of the male, except that bosses are inconspicuous or absent. The shape of the head and form of oesophagus are similar to those in the male. The oesophagus measures 0.7 to 1.1 mm. in length by 0.03 to 0.04 mm. in width. In some specimens the anus is ill-defined and may not be patent. The ovarian tubes begin in the posterior part of the body. The uteri are packed with well-developed embryos. The uteri pass forward to a point about 2 to 3 mm. from the anterior end, where they unite to form the vagina. This is a muscular tube about 1 mm. in length; it leads through a muscular bulb to the vulva, which opens in the immediate post-oesophageal region about 1.1 to 1.5 mm. from the anterior end. There is a distinct bulge at this point; opisthodelphys (Text-fig. 1). The tail ends in four digitations as in the male. A pair of minute subterminal papillae was detected in some specimens. The length from anus to tip of tail is 0.145 mm.

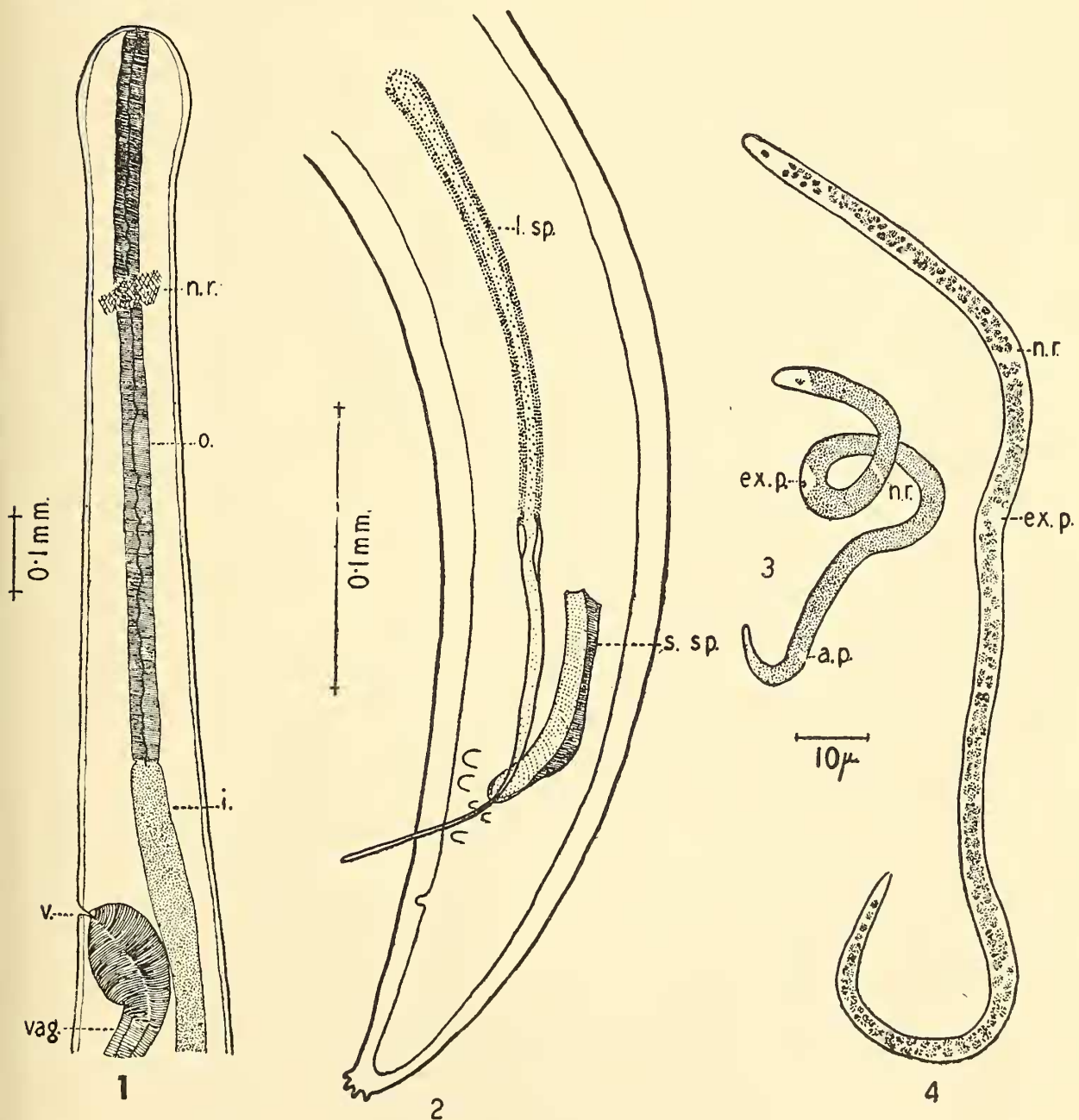
MICROFILARIA.—These were not detected in blood films, but in sections of the skin they were regularly found lying immediately below the Malpighian layer (Plate 1, figs. 1 and 2).

Specimens from the uterus of the female measure 0.110 mm. to 0.120 mm. by 0.004 mm. The head is blunt, with two refractile spots in Leishman-stained smears. The tail is pointed. The nerve ring is 0.025 to 0.03 mm. and the excretory pore 0.04 to 0.045 mm. from the anterior end. No sheath was detected (Text-fig. 3). Specimens found in thick, tangential sections of the skin are considerably longer.

Two perfect specimens measure 0.19 and 0.2 mm. in length respectively, by 0.004 to 0.005 mm. in width. The head is blunt; no refractile spots were detected. The nerve ring lies 0.045 to 0.05 mm. and the excretory pore 0.075 mm. from the anterior end. The anal pore was not defined (Text-fig. 4).

Microfilariae have only been found in skin sections of those animals which harboured the adult worms, and it is assumed they originated from them. The differences in measurement may be due partly to shrinkage in a dried film, but it seems likely that some growth had also occurred. The positions of the nerve ring and excretory pore are the same proportionally as in those from the uterus.

TAXONOMIC NOTES.—The tip of the tail seems quite characteristic, no other species being recorded with four terminal digitations. It differs in size (being much smaller) from all the described species except *D. rarum* Johnston and Mawson, which is known only from the female, *D. dasyuri* Johnston and Mawson, and *D. capilliforme*



Text-figs. 1-4. *Dipetalonema johnstoni* n. sp.: fig. 1, anterior end of female; fig. 2, posterior end of male in ventro-lateral view; fig. 3, microfilaria from uterus; fig. 4, microfilaria from skin; a.p., anal pore; ex.p. excretory pore; i. intestine; l.sp., long spicule; n.r., nerve ring; o., oesophagus; s.sp., short spicule; v. vulva; vag. vagina.

Baylis. In *rarum* the head bears four papillae and the tail two subterminal papillae; the vulva is further back (3.55 mm.) than in *johnstoni* n. sp. (1.1 mm.). In *dasyuri* the vulva is very much further back, being 6 mm. from the anterior end; moreover, the spicules in *dasyuri* are short and nearly equal. In *capilliforme* the females are usually larger, about 140 mm. by 0.3 mm., than in *johnstoni* n. sp. (about 50 mm. by 0.2 mm.), but the oesophagus is shorter and the vulva nearer the anterior end.

I have named this species in honour of the eminent Australian parasitologist, the late Professor T. Harvey Johnston of Adelaide.

DIPETALONEMA THYLOGALI n.sp.

The adult worms were found in the peritoneal and pleural cavities of a red-legged wallaby, *Thylogale wilcoxi*, from Tamborine, South Queensland.

TYPES.—Holotype male and allotype female have been deposited in the Queensland Museum.

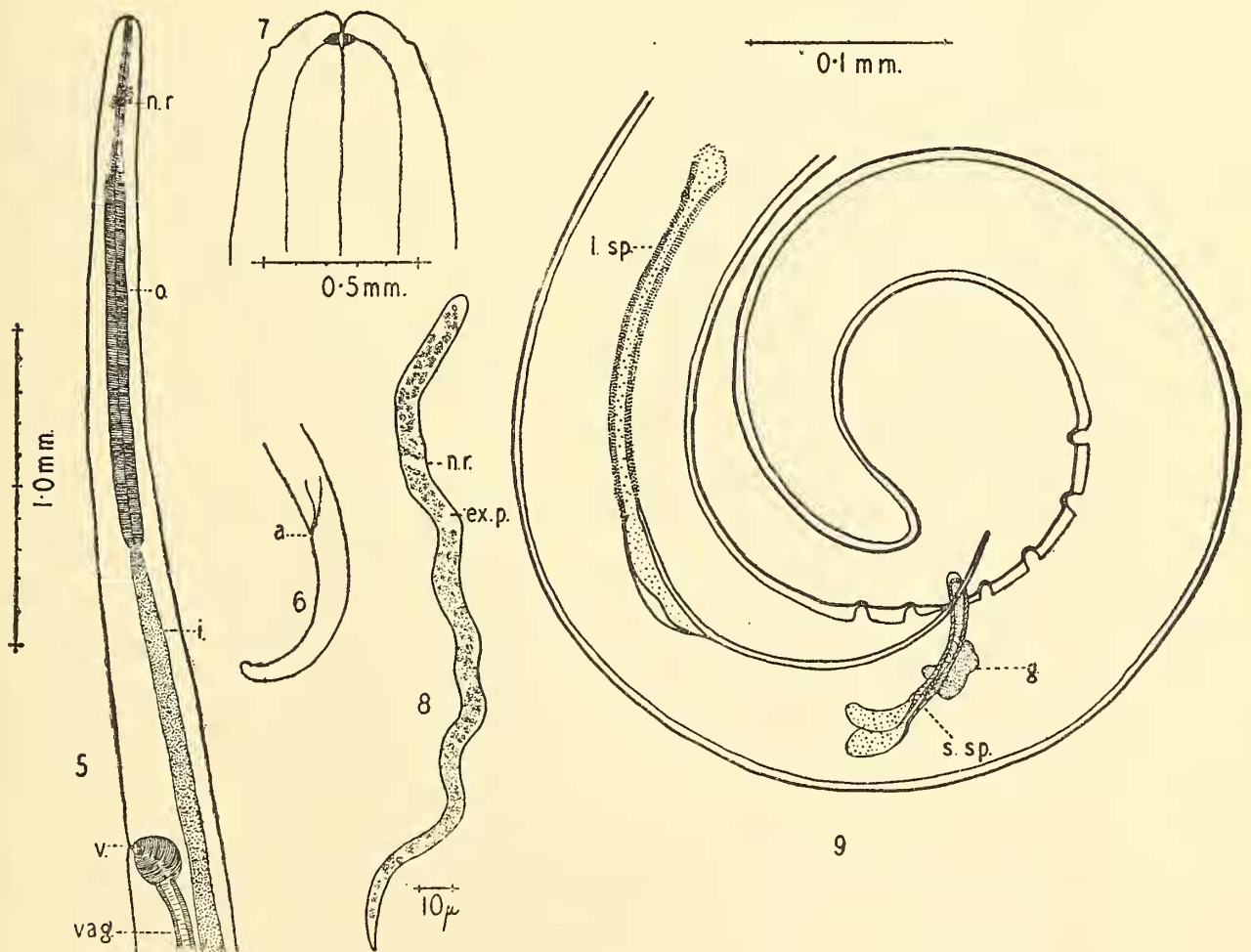
DISTINCTIVE FEATURES.—Relatively short, slender worms; cephalic papillae well-developed; with a chitinous ring at the base of the buccal cavity; cuticle transversely striated; oesophagus distinctly divided into two parts, vulva post-oesophageal; tail bluntly rounded; long spicule complex, short one relatively simple; gubernaculum present.

MALE.—A single specimen found in the mesentery measured 37 mm. long by 0.2 mm. in maximum breadth. The cuticle is smooth anteriorly, but fine striations appear in the mid-oesophageal region. They are more pronounced in the middle of the body, appearing as regular lines 0.005 mm. apart. Some irregular, minute, elongate bosses are associated with the striae, and are best defined in the spiral region of the posterior end. Both striae and bosses fade out in the cloacal region. There is no neck, the width of the head end increasing gradually from before backward. There is an outer circle of four, moderately large, cephalic papillae, and an inner circle of smaller ones, difficult to count. A chitinous ring is present at the base of the minute buccal cavity. The oesophagus consists of a narrow anterior portion, 0.44 mm. long by 0.03 mm. wide, and a longer, broader posterior section, which is 1.2 mm. long by 0.05 mm. wide. The nerve ring is about 0.21 mm. from the anterior end. The posterior part of the body is coiled in a loose spiral of three turns. The bluntly rounded tail measures 0.45 mm. from tip to cloaca.

The left spicule is 0.45 mm. long. It consists of a stiff, tubular proximal portion 0.2 mm. long by 0.02 mm. in maximum diameter, a shorter, more flexible-looking portion supported by two strong, marginal struts, and a curved, needle-like distal portion about 0.19 mm. long. The right spicule is 0.11 mm. long. The proximal end is expanded into two lobes which are less heavily chitinised than the remainder. The distal end is rounded, spatulate. There is a small, rectangular gubernaculum, 0.03 mm. in length, which is grooved on the ventral aspect to accommodate the small spicule, which in turn appears to support the long spicule (Text-fig. 9; plate 1, fig. 4). The cloacal papillae are large; there are two pairs of pre-anal, one pair of ad-anal (not shown in diagram) and four pairs of post-anal papillae, the last pair being asymmetrically placed.

FEMALE.—One intact and one broken specimen were studied. Length 98 and 94 mm. by 0.45 mm. in maximum diameter. The cuticle resembles that of the male, except that bosses are ill-defined or absent. The head and conformation of the oesophagus resemble those of the male. The anterior part of the oesophagus is 0.45 mm. by 0.03 mm., and the posterior part 1.4 mm. by 0.07 mm. in width. The anus is clearly patent. The nerve ring lies between 0.2 and 0.3 mm. from the anterior end. The ovarian tubes begin in the posterior part of the body. The uteri contain microfilariae, and pass forward side by side to within 4 or 5 mm. of the anterior end, where they unite to form the vagina. This is thrown into coils before opening to the exterior through a muscular bulb. The vulva is in the post-oesophageal region, 2.8 mm. from the anterior end; opisthodelfys. The length of the tail from tip to anus is 0.55 mm. (Text-figs. 5 and 6).

MICROFILARIA.—Scanty microfilariae were found in smears taken from blood clot around the heart. It should be noted that the lungs, diaphragm and liver had been removed from the wallaby in the search for hydatid cysts before the carcass was examined for filariae. At least one mature female worm had been damaged, so that the presence of microfilariae in blood films may have been an artefact. They were not, however, found in skin sections. Measurements in Leishman-stained films were:—Length 0.210 to 0.245 mm. by 0.007 to 0.008 mm. in width. The head is rounded and the tail pointed. The nerve ring is 0.05 to 0.06 mm. and the excretory pore 0.075 mm. from the anterior end. The anal pore was not defined.



Text-figs. 5-9. *Dipetalonema thylogali* n. sp.: fig. 5, anterior end of female; fig. 6, posterior end of female; fig. 7, head of female; fig. 8, microfilaria from blood; fig. 9, tail of male. Figs. 5 and 6 are to the same scale. a., anus; ex. p., excretory pore; g., gubernaculum; i., intestine; l. sp., long spicule; o., oesophagus; s. sp., short spicule; v., vulva; vag., vagina.

TAXONOMIC NOTES.—This species appears to be nearly related to *D. robertsi* Johnston and Mawson, but may be distinguished by its smaller size; by the position of the vulva, 2.8 mm. from the anterior end in *thylogali* n. sp., 6.5 mm. in *robertsi*; by the smooth tail, subterminal papillae present in *robertsi*; by the greater length of the long spicule and the greater disproportion of the two spicules, left four times length of the right in *thylogali* n. sp., only twice length in *robertsi*.

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SUMMARY.

Two new filariid parasites are described from marsupials from South Queensland. *Dipetalonema johnstoni* n. sp. is described from the subcutaneous tissue of the bandicoots, *Isoodon obesulus* and *Perameles nasuta*; and *Dipetalonema thylogali* n. sp. from the body cavity of the red-legged wallaby, *Thylogale wilcoxi*.

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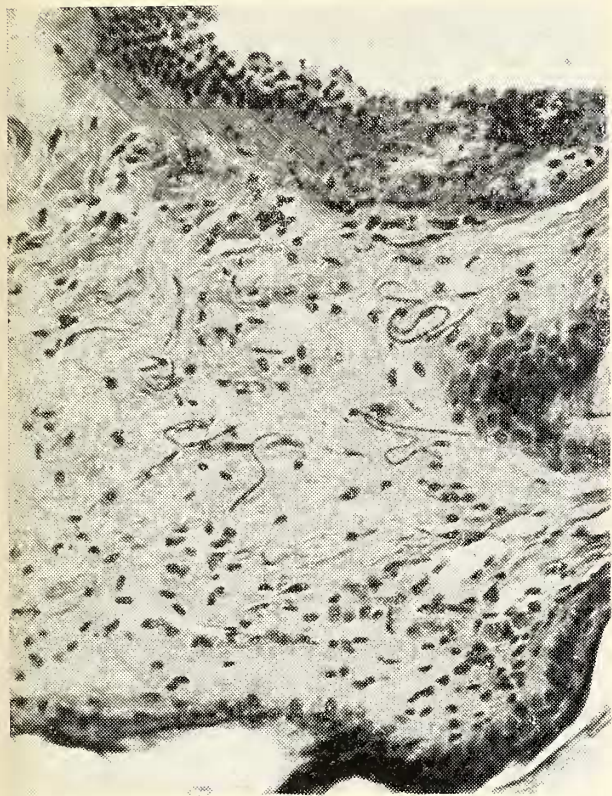
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EXPLANATION OF PLATE I.

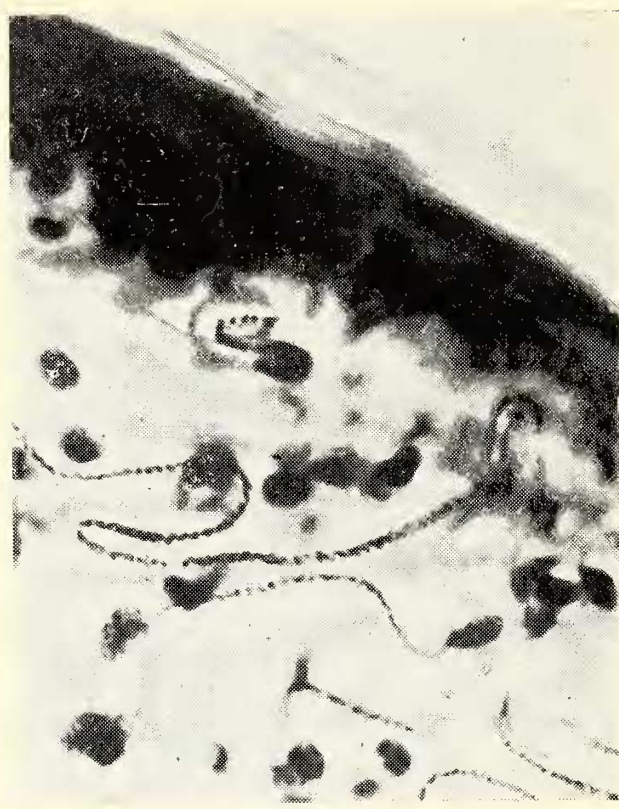
Dipetalonema johnstoni n. sp.—Fig. 1, vertical section of skin of bandicoot showing microfilariae, x 192; fig. 2, high power view of another field, x 650; fig. 3, posterior end of male.

D. thylogali n. sp.—Fig. 4, posterior end of male. g., gubernaculum; p. l. sp., proximal part of long spicule; s. sp., short spicule; t. l. sp., tip of long spicule.

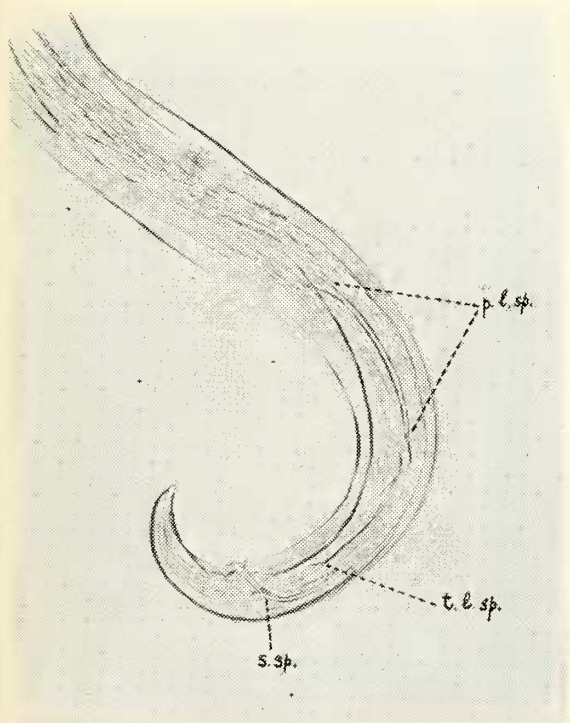
(Figs. 3 and 4 are at the same magnification; the small divisions in the scale equal 0.01 mm.)



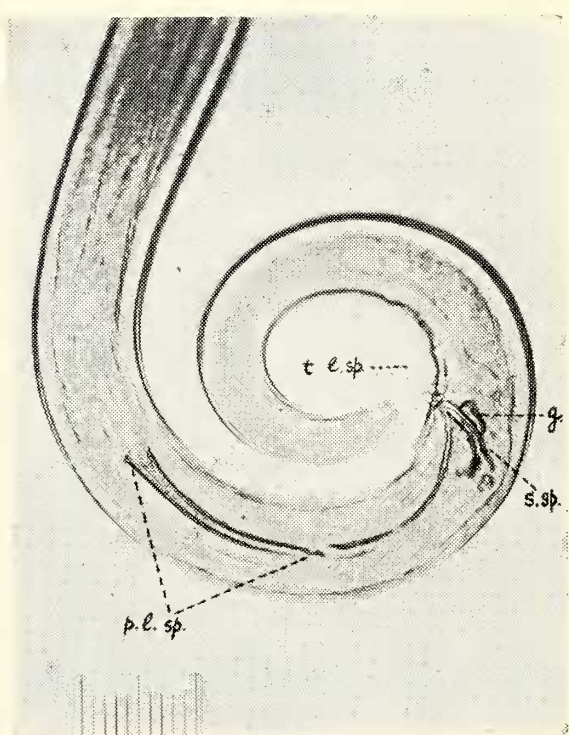
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